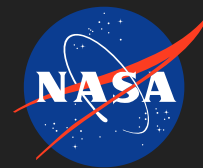


# Holey Nanocarbon Architectures for High-Performance Li-Air Batteries

Completed Technology Project (2016 - 2017)



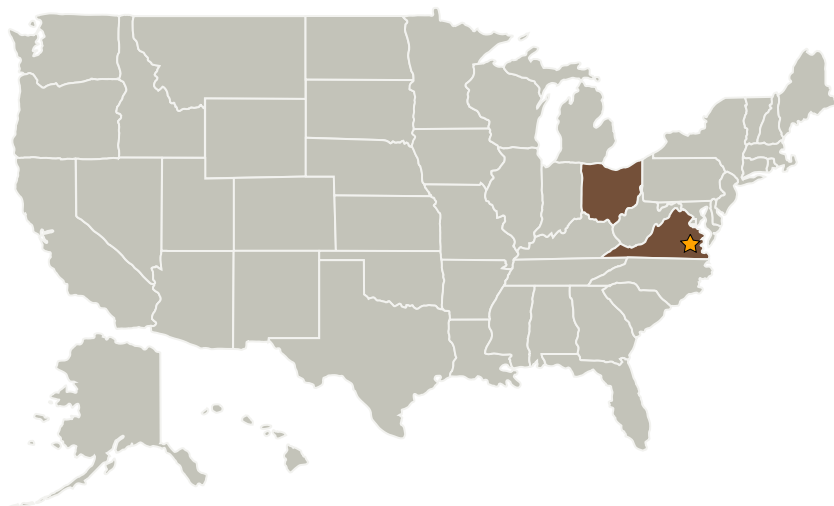
## Project Introduction

Li-air batteries (LABs) have a theoretical energy density of 3500 - 5000 Wh/kg, nearly 10 times that of conventional Li-ion batteries (LIBs). A huge advantage is that the oxygen reactant at the cathode can be directly obtained from air ("air cathode"), thus significant cost and weight reduction of the battery can be obtained. However, major challenges remain for the LAB air cathodes, such as low catalytic efficiency and poor oxygen diffusion during long-term cycling.

## Anticipated Benefits

LABs could result in an estimated 80-percent weight savings for energy storage systems in comparison to the LIBs in future "green aviation" aircrafts. LABs are also relevant to crewed space exploratory missions because there will be an oxygen-containing atmosphere in spacecrafts and habitats. LAB technology is expected to have a major national impact on the development of electric and hybrid vehicles and soldier- portable power systems. With some modifications, our material-based electrode technology could also be applied to various battery, supercapacitor, and other energy conversion and storage systems.

## Primary U.S. Work Locations and Key Partners



Holey Nanocarbon Architectures  
for High-Performance Li-Air  
Batteries

## Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	3
Technology Areas	3
Target Destination	3

# Holey Nanocarbon Architectures for High-Performance Li-Air Batteries

Completed Technology Project (2016 - 2017)



Organizations Performing Work	Role	Type	Location
★ Langley Research Center (LaRC)	Lead Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Ohio	Virginia

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Langley Research Center (LaRC)

### Responsible Program:

Center Innovation Fund: LaRC CIF

## Project Management

### Program Director:

Michael R Lapointe

### Program Manager:

Julie A Williams-byrd

### Principal Investigator:

John W Connell

### Co-Investigator:

Yi Lin

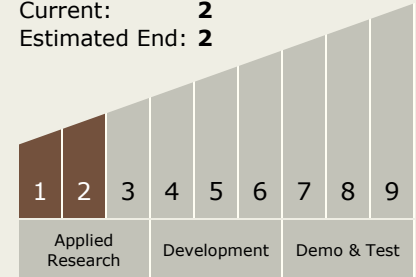
# Holey Nanocarbon Architectures for High-Performance Li-Air Batteries

Completed Technology Project (2016 - 2017)



## Technology Maturity (TRL)

Start: **1**  
Current: **2**  
Estimated End: **2**



## Technology Areas

### Primary:

- TX03 Aerospace Power and Energy Storage
  - └ TX03.2 Energy Storage
    - └ TX03.2.1 Electrochemical: Batteries

## Target Destination

Mars